anastomosing longitudinally, black, often hoary at surface; substance composed of obscurely filamentous, septate, gelatinized hyphae mostly 3–4μ in diameter, bearing spores at their tips; conidia dark olivaceous, composed of mostly 4, less commonly 3, rarely 5 rows of cells closely appressed in a single plane, arising from a basal cell, each row 3–7-septate, the basal cell somewhat and the terminal cells distinctly paler than the others, 27–39 $\times$15–22μ in face view, 6–10μ thick.

On oak bark in moist chamber, Iowa City, Iowa, December, 1943. *G. W. Martin* 4921, type.

As may be seen from the illustration, especially Fig. 2, *a–c*, the development of the spores of *C. digitatus* is fundamentally different from the process as described by Höhnel for *C. speiroides*. It seems probable, therefore, that his removal of the latter species to his new genus *Cheiromycella* is justified, although for a reason different from that originally stated.

ZOOLOGY.—*Notes on Mexican snakes from Oaxaca.*[1]

By Angus M. Woodbury and Dixon M. Woodbury, University of Utah. (Communicated by Herbert Friedmann.)

This paper is a report of studies made of 136 specimens of snakes of 25 species in the herpetological collection of the University of Utah obtained from Wilbur Barker who reports that they were collected from the general vicinity of Tehuantepec, Oaxaca, Mexico, on the Isthmus of Tehuantepec. According to notes of field collections, most of them come from places in or near the city, but a few specimens are reported from areas 10 or 15 miles away. These notes have also been useful in helping to elucidate the habitats occupied.

We are greatly indebted to Dr. Hobart M. Smith for advice during the progress of the study and for his comments and criticism of our views of the problems. All colors are referred to the *Dictionary of color* by Maerz and Paul.

Leptotyphlops phenops phenops (Cope)

Six specimens, usually found under litter. They show unusually high total scale counts. The rostral is white dorsally and is completely separated from the supraoculars by the nasals. The scales usually have dark brown centers, which become lighter ventrally and in some cases become indistinguishable from the edges. The scale edges are light brown, sometimes giving a whitish aspect. Dorsally the dark centers tend to connect in longitudinal series to form seven dark stripes which usually have a beaded appearance due to the narrow connections between the dark centers. The tail beyond the end of the stripes is black above and is white below for half or two-thirds of its length, the white involving the tip.

Scalation of 5 specimens: Total scales from rostral to tip of tail 251, 256, 261, 265, 277; subcaudals 19, 18, 19, 17, 17; longitudinal scale rows 14.

Measurements: Total length 76, 155, 81, 195, 171 mm; tail length 5, 8, 5, 10, 8 mm.; ratio of tail to total length 6.6, 5.2, 6.2, 5.1, 4.7 per cent.

Loxocemus bicolor bicolor Cope

Light-chinned American Python

Five specimens (UU 2507 ♂, 2522 ♂, 2707 ♂, 2718 ♀, 2800 ♂) from wooded areas containing fallen logs, leaf litter, and loose soil, where it is usually concealed in the litter, under logs, or behind the bark. According to the collector's notes, the two forms of *Loxocemus* are found in the same habitat.

The dorsal color is a dark brown, darkest on the head; the ventral is light gray with slight variations. Details of color and scalation will be discussed under *L. b. sumichrasti*.

Loxocemus bicolor sumichrasti Bocourt

Dark-chinned American Python

Four specimens (UU 2526 ♀, 2530 ♀, 2717 ♀, 2737 ♀) from the same habitat where *L. b. bicolor* was found. The dorsal color is essentially alike in the two forms, but differences occur on the ventral surface. These colors are analyzed quantitatively as well as qualitatively in the following table, which is based upon the *Dictionary of color*, by Maerz and Paul, 1930. This shows for the dorsal, ventral, and chin colors for each specimen the Maerz and Paul number in the dictionary and the components of the inks used to produce those colors as sorted out

[1] Received April 24, 1944.

and translated into percentage in the various columns. These percentages are based upon the gradations used in the dictionary to produce the various hues and thus represent quantitative measurements of the colors of the snakes in terms of the colors found in the dictionary.

ABDOMINAL COLOR

Loxocemus bicolor sumichrasti

		0 10 20 30 40 50 60 70 80 90 100%
2737 ♀	orange	-·-
	red	----------
	gray	————
2530 ♀	orange	-·-
	gray	————
2717 ♀	orange	-·-·-·-·-·-·-·-·
	red	----------
	gray	————
2526 ♀	orange	-·-
	gray	————

Loxocemus bicolor bicolor

2522 ♂	yellow	.....
	orange	-·-·-·-·-·-·-·-·-·-·-·-·-·-·-·-·
	gray	————
2718 ♀	gray	————
2707 ♂	gray	————
2800 ♂	gray	————
2507 ♂	yellow	.....
	orange	-·-·-·-·-·-·-·-·-·-·-·-·-·-·-·-·
	gray	————

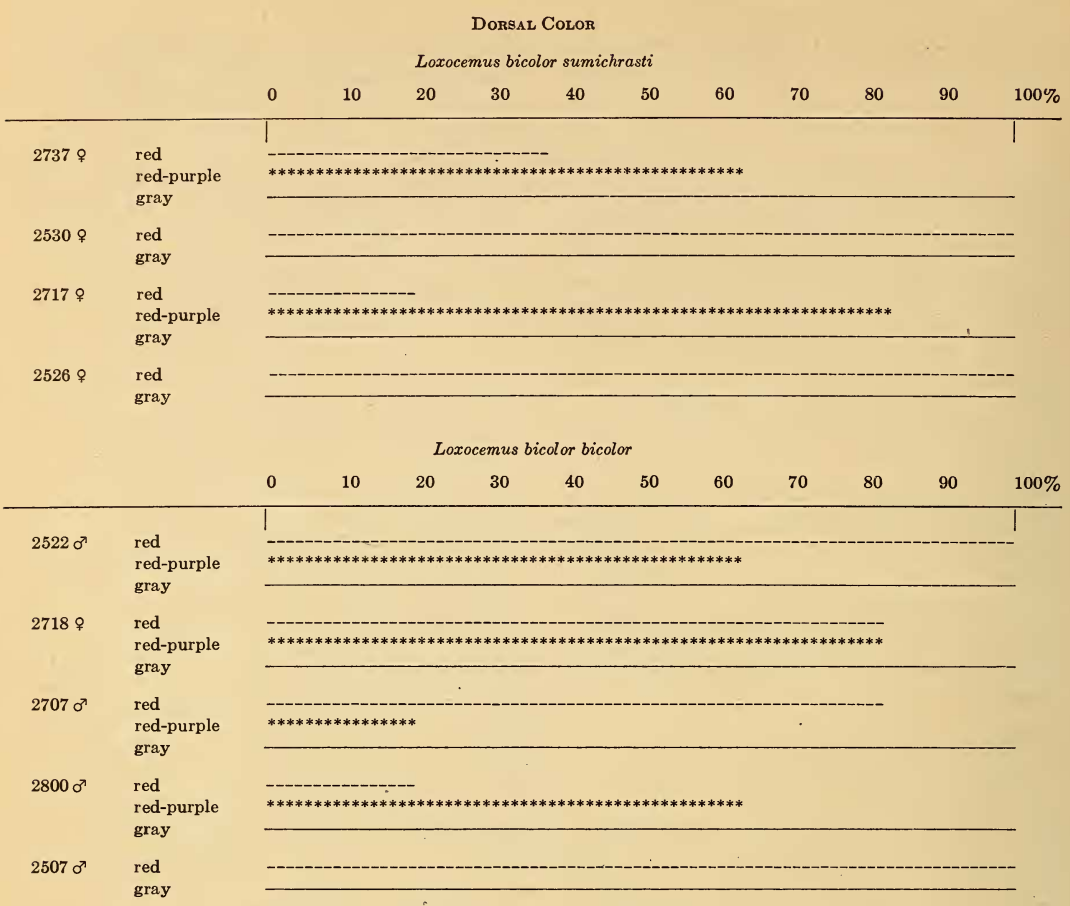
CHIN COLOR

Loxocemus bicolor sumichrasti

		0 10 20 30 40 50 60 70 80 90 100%
2737 ♀	red	----------
	gray	————
2530 ♀	red	----------
	red-purple	**********
	gray	————
2717 ♀	red	----------
	gray	————
2526 ♀	red	----------
	gray	————

Loxocemus bicolor bicolor

		0 10 20 30 40 50 60 70 80 90 100%
2522 ♂	gray	————
2718 ♀	orange	-·-·-·-·-
	gray	————
2707 ♂	orange	-·-·-·-·-
	gray	———— ————
2800 ♂	orange	-·-·-·-·-·-·-·-·
	gray	————
2507 ♂	orange	-·-·-·-·-·-·-·-·
	gray	————



Nos.	Dorsal color				Abdominal color					Chin color					
	M & P No.	Per cent of color			M & P No.	Per cent of color				M & P No.	Per cent of color				
		Gray	Red	Red-purple		Gray	Red	Orange	Yellow		Gray	Red	Red-purple	Orange	Yellow
Loxocemus bicolor bicolor															
2507 ♂	8L1	100	100	0	13G6	57	0	45	55	13A3	57	0	0	18	0
2522 ♂	8H4	100	64	64	13F6	57	0	45	45	14A1	71	0	0	0	0
2707 ♂	8J2	100	82	18	5A7	57	0	0	0	14A2	71	0	0	9	0
2718 ♀	8J5	100	82	82	5A7	57	0	0	0	14A2	71	0	0	9	0
2800 ♂	8C4	100	18	64	3A7	28	0	0	0	14A3	71	0	0	18	0
Loxocemus bicolor sumichrasti															
2526 ♀	8L1	100	100	0	7A11	86	0	82	0	8H1	100	64	0	0	0
2530 ♀	8L1	100	100	0	7A11	86	0	82	0	8J2	100	82	18	0	0
2717 ♀	8C5	100	18	82	7C9	86	18	18	0	8H1	100	64	0	0	0
2737 ♀	8E4	100	36	64	8L10	100	100	64	0	8J1	100	82	0	0	0

The following table gives comparative material on scalation and measurements:

Number	Scale Rows	Abdominals	Caudals	Labials		Length			Ratio %
				Supra	Infra	Body	Tail	Total	
Loxocemus bicolor bicolor									
2507 ♂	31–33–25	254	42	11–11	12–12	477	56	533	10.5
2522 ♂	31–33–26	256	39	11–11	12–12	652	68	720	9.4
2707 ♂	31–35–26	260	41	11–12	12–12	620	67	687	9.8
2718 ♀	29–33–25	254	42	11–11	12–13	695	80	775	10.3
2800 ♂	33–33–25	256	40	11–11	14–13	878	86	964	8.9
Loxocemus bicolor sumichrasti									
2737 ♀	31–33–25	263	46	11–11	14–13	1061	125	1186	10.5
2530 ♀	31–33–26	252	42	9–9	11–12	555	60	615	9.8
2717 ♀	31–33–26	254	41	11–11	11–12	647	72	719	10.0
2526 ♀	31–33–25	251	41	10–10	12–13	543	62	605	10.2

Discussion.—Dr. Hobart M. Smith (1943, p. 445) has considered these two forms as distinct species, but the evidence at our disposal raises the question whether they are separate species or merely subspecies. Admittedly, the evidence is inconclusive, and any decision at the present time, based upon such evidence as is now available, must of necessity be only tentative, pending the accumulation of more conclusive data.

No evidence is available to indicate that the two forms occupy different habitats. In fact, the field notes of the collector indicate that both forms were taken from the same habitat in wooded areas containing leaf litter, fallen logs, and loose soil, presumably during the dry season. Smith (letter, March 5, 1944) adds that they appear to be underground during the dry season. Without contradictory evidence, it must be assumed that they occupy the same niche in the same habitat in Oaxaca.

According to Smith (letter, September 19, 1942), the two forms occupy the same range from the Isthmus of Tehuantepec northwestward to Morelos and Guerrero, a distance of about 300 miles; but beyond that to Colima, another 300 miles, only *sumichrasti* is known, while southeastward from the isthmus to El Salvador, about 400 or 500 miles, only *bicolor* is known.

Presumably, the habitat occupied in Oaxaca is typical of that throughout the range of both forms. Smith (1942, p. 201) has implied in a similar case that there might be some sort of a barrier separating two forms in the same habitat. He indicates (letter, March 5, 1944) that such barriers may include breeding at different times of year, repugnance to odor, emergence at different times of day or night, or many other possibilities. To date, however, no such barriers have been discovered; at least none are known to the writers. In the absence of evidence about such barriers, one way or another, the writers are inclined, on the basis of other evidence, to assume that they do not prevent interbreeding.

In relation to scalation, Smith (letter, December 23, 1943) states, "I early dropped the idea of any constant differences in scutellation; they may exist, but I did not discover them, and those proposed by Taylor do not hold." Smith's conclusion seems to fit our specimens from Oaxaca, where the chin-shield characters suggested by Taylor (1940a, p. 447) show considerable intergradation. We do not know whether there might be constant differences between specimens from Colima and El Salvador, extremes of the two ranges. If so, the condition in Oaxaca would indicate intergradation. Otherwise, the hereditary scutellation in the two forms is so nearly identical as to be indistinguishable in the present state of knowledge.

Dorsal color appears to be as indistinguishable as scalation. It is in the ventral color where differences appear. Some are darker than others underneath. The abdominal color seems to show some indications of intergradation between the dark and light phases, but chins show decided contrast, some light, others with dark markings.

This is the critical difference in heredity be-

tween the two forms, and the question arises whether such differences could be maintained in heredity if interbreeding occurs. So far as the writers are aware, there is nothing in genetics against the idea of inheritance of alternative characters in the same interbreeding population. The light and dark chins may well be alternative characters transmitted by the same parents. They may even be unit characters that cannot intergrade.

Klauber (1936, p. 18; 1939, pp. 1–23) has shown that king snakes in California may transmit to different members of the same brood either the striped or the banded pattern, which would be suspected of belonging to much more complicated heredity patterns than the chin color of the American pythons. It thus seems that it stands well within the realm of possibility, as well as of probability, that these chin patterns could well be transmitted within an interbreeding population in distinct form so that the possessors could readily be distinguished from one another, even though they might intergrade or be indistinguishable in all other characters.

If it be an interbreeding population where the two ranges overlap, how can the spread of one form to the north and the other to the south be explained? Would it necessarily imply that the two forms had once been separated and had later been freed of the separating barrier and are now gradually mixing so that the forms will eventually become completely mixed and the distinctions vanish? Or might it imply that the two types arose in the same population and one spread southward and the other spread northward? If so, might this be another example of the principle of segregation of different types in different geographic areas of which there are so many examples everywhere, the genetics of which are discussed by T. Dobzhansky in his *Genetics and the origin of species* (1937, p. 147), and by R. C. Murphy in his article on "The Need of Insular Exploration as Illustrated by Birds" (Science **88**: 535). 1938)?

In light of the well-known Jordan's rule, which holds that the nearest relative of a species is not found in the same area, but in an adjacent area separated by some sort of barrier, it could not be maintained that these forms represent different species unless a barrier of some sort could be found to prevent interbreeding and force them into different niches in the habitat.

The rule of ecological incompatibility, based upon extensive evidence from paleontology, zoogeography, and taxonomy, is even more convincing. This rule (Ángel Cabrera, 1932, p. 114; 1935, p. 509) holds that "related animal forms are ecologically incompatible, and their incompatibility is the more profound, the more directly they are related." It seems inconceivable that two forms could occupy the same ecological niche in competition with each other without either interbreeding or being crowded into separate niches.

In light of the available evidence, it seems that the weight tips the scales heavily in the direction of the idea that the snakes represent one species with two subspecies that interbreed in the intermediate range. This conclusion seems tenable unless and until evidence is found to show that the two forms occupy different niches in the same habitat separated by some kind of barrier. This conclusion seems to be in harmony with the practices in the much more intensively studied fields of ornithology and mammalogy.

Constrictor constrictor imperator (Daudin)

Banana Boa

Three females, found around banana groves. Dorsal ground color light brown or gray. Dark lines on head form a cross between eyes. A series of 25 to 29 dark brown biconcave transverse dorsal blotches, sometimes with small light centers and sometimes connected laterally to enclose oval dorsal areas of lighter ground color. A dorsolateral series of small triangular blotches are separated anteriorly by a lighter line about 2 or 3 scales wide from the dorsal blotches with which they tend to alternate, but with which they tend to coalesce posteriorly, enclosing portions of the light line which finally disappear before the tail is reached. A series of diamond-shaped dark brown light-centered lateral blotches run the length of the body. Ventral ground color is creamy white, mottled with light brown and with a tendency toward a double row of black spots or groups of spots which run the length of the body and fuse into a single row on the tail.

Dorsal scale rows, 54-63-36, 60-75-41, 55-75-36; supralabials, 16-16, 19-20, 18-18; infrala-

bials, 19-19, 23-23, 22-23; dorsal body blotches, 27, 25, 29; abdominals, 240, 250, 257; caudals, 59, 68, 67 respectively; anal entire. Greatest length, body 646 mm, tail 83, total 729; tail 11.4 to 13.1 per cent of total length.

Masticophis mentovarius mentovarius (Duméril and Bibron)

Six specimens, all collected in banana groves, apparently feeding on rats and mice. These specimens of different sizes and ages show sequences in changes of the color pattern. The most conspicuous juvenile pattern occurs on a specimen (UU 2771 ♀) 1,130 mm in length and probably about three years of age. The top of the head is dark brown, and this extends onto the sides but is there mottled with cream, especially on the preoculars and postoculars and upper labials. Behind the head the brown dorsal color is darker in the neck region but lighter on the posterior half of the body, where it becomes suffused with pink, especially on the sides and on the tail. The ventral ground color is cream or yellow anteriorly and is mottled on chin and throat with dark brown spots which tend to form two central rows. The cream or yellow ground color is gradually replaced by pink on the posterior abdomen and tail.

On the side of the neck a series of distinct light and dark lines extending backward tend to become fainter and disappear posteriorly, but two of the lines persist faintly as far as the anus. Each dark line consists of dark spots or streaks through the center of successive scales with one exception, in which case the line is located on the ends of abdominals. The light lines include the lateral edges of the scales and tend to run between the scale rows. Dorsally the dark spots on the scales become enlarged and occupy most of the scale surface and the light lines tend to become obsolete. One centimeter behind the head the first, second, and fifth light lines are most conspicuous. Four centimeters behind the head the fourth line is lost by reduction of scale rows. Posteriorly the lines disappear by reduction in contrast of colors.

A second specimen (UU 2784 ♂) of approximately the same size and age, 1,160 mm in length, has the same pattern except that the lines do not persist so far posteriorly.

An 866-mm specimen (UU 2715 ♀) about two years of age shows essentially the same pattern with slight variations. Just behind the head the second and fifth light lines are most conspicuous, and dorsally the ninth light lines form a conspicuous pair that extend backward a short distance and forward to make semicircular turns around the side of the neck to the angle of the mouth just missing the last upper labials. The dorsal color anteriorly behind the head is dark gray rather than brown.

A 548-mm specimen (UU 2719 ♀) about one year of age closely resembles the preceding specimen except that the first light line is nearly as conspicuous as the second and the ninth stripes although discernible are inconspicuous.

By contrast with these young specimens, two older specimens (UU 2528 ♂, 2792 ♀), 1,690 and 1,741 mm in length, except for a decided reduction in the line effects, show the typical color pattern with brown head, dark gray dorsal anterior color intergrading posteriorly with brown and ventral color essentially as previously described. Some of the lateral lines are faintly discernible, the second being most conspicuous.

Scalation: Scale rows, 19-17-13; supralabials, 7-7; infralabials, 10-10 in four specimens, 9-10 in one, and 9-9 in one. Preoculars 2-2 in five, and 3-2 in one specimen; postoculars, 2-2; loreals, 1-1 in four specimens, 1-2 in one, and 2-2 in one. Nasal divided.

Slight sexual dimorphism is indicated in the following comparison of the sexes: 2 males show 187 and 192 (189.5) abdominals, 109 and 114 (111.5) subcaudals, 836 and 1,225 mm body length, 324 and 465 mm tail length, and ratios of 27.5 and 27.9 per cent tail to total length; whereas 4 females show comparative figures of 194 to 201 (198) abdominals, 107 to 112 (109) subcaudals, 410 to 1,292 mm body length, 138 to 449 tail length and ratios of 25.2 to 27.3 per cent tail to total length.

Discussion.—Basically the striping pattern of longitudinal dark spots or streaks through the centers of scales and light streaks between scale rows formed by light lateral edges is identical with the striping pattern of *M. t. taeniatus*. Even the emphasis on the stripes is very similar. The light stripes are more conspicuous on the sides, but the dark stripes so dominate the dorsum that the light stripes are nearly obsolete in both races.

There are, of course, some differences. In *taeniatus* this pattern is distinctly visible

throughout the full length of the body and extends even on to the tail, whereas in the young of *mentovarius*, up to about three years of age, it is distinctly visible only on the anterior part of the body and fades posteriorly until it is nearly obsolete near the anus. In adult specimens, however, this fading is much more pronounced but is generally recognizable on the neck, even though it may become completely obsolete elsewhere.

This similarity of the adult *taeniatus* to the young *mentovarius*, even though the posterior part of the pattern is only faintly visible, is so striking as to strengthen the hint given by Hartweg and Oliver (1940, p. 19) that *mentovarius* might belong to the *taeniatus* group. This raises the question of whether the faintly visible pattern of the young *mentovarius* is an expanding pattern which will eventually spread to the adult stage or a remnant of a more complete pattern like that of *taeniatus* which has been nearly lost in the adult and is now being suppressed in the young.

The preponderance of available evidence favors the latter idea that color patterns of young reptiles are atavistic. It is consonant with the general idea of growth and development in which the zygote is generalized and successive steps of cell multiplication offer chances for more and more specialization. The older the individual and, consequently, the farther removed from the zygote the greater is the chance for divergence from ancestral conditions. This idea is essentially in agreement with Eimer,[2] who outlined color pattern changes in the lizards of the genus *Lacerta* of the Old World and with Cope,[3] who did likewise with the lizards of the genus *Cnemidophorus* in the New World both of which practically parallel the present case. In both genera striping was considered to be primitive, and it was shown that adults of some species maintained the striped pattern throughout life, whereas others abandoned the striped color pattern of the young in later stages of life, and developed other color patterns of broken lines, crossbands, reticulations and finally spots on a plain background, some species reaching one stage, other species continuing on through to the other stages.

In the absence of evidence to indicate a mutation producing a striped pattern of the embryo from nonstriped parents in the *Masticophis* snakes, the alternative idea of atavistic color patterns in the young becomes predominant.

In the matter of scalation, Stuart (1941, p. 31) indicates a reduction trend in dorsal scale rows in the *Dryadophis–Salvadora–Masticophis-Coluber* series. If this conclusion be accepted, then the higher scale formula, 19-17-13 in *mentovarius* is doubtless more "primitive" than the 15-13 formula of *taeniatus*. This suggests the idea that the latter has been obtained by reduction from a larger scale-formula, probably similar to that of the former.

If the implications of Stuart (*ibid.*) in relation to the probable derivatives of *Dryadophis* are tenable, then it seems possible that the genus *Masticophis* could have been derived from South American stock that spread northward through Central America. In that case, the evidence would tend to support Smith's hypothesis (1941, pp. 388, 396) that the northern races had been derived from primitive stock south of the Isthmus of Tehuantepec.

The evidence from scalation is in agreement with this hypothesis, but the evidence from color pattern seems to call for a slight modification of Smith's (*ibid.*) conclusion that *mentovarius* "represents the nearest approach to the ancestral type of pattern in the genus." This can be brought into harmony by assuming that the primitive ancestor had both high scale-formula and full body pattern. Then both *taeniatus* and *mentovarius* could be derived, the former by reduction in scale formula, the latter by reduction of color pattern from the primitive conditions.

Thamnophis ruthveni Hartweg and Oliver

Eight specimens were collected in light brush open fields, and pastures, around water. These snakes fit closely the description of Oliver (1938, pp. 1–4) from this same locality. The lower two postoculars are white as is the posterior half of the preoculars. Two males have: Abdominals 151, subcaudals 71 and 74, body length 346 and 350 mm, tail length 96 and 102 mm, ratio of tail to total length 21.7 and 22.6 per cent. Six females have: Abdominals 143 to 152 (146), subcaudals 59 to 70 (63.7), body length 334 to 570 mm, tail length 94 to 130 + mm, ratio of tail to total length 20.4 to 22.0 per cent.

[2] Archiv für Naturg. **1881**: 239.

[3] *The primary factors of organic evolution:* 41–45. 1896.

Salvadora lemniscata (Cope)

Nine specimens were collected in banana and coconut groves and open fields. These specimens all agree with Bogert's description of this species (1939, pp. 140–147). Eight males have: Abdominals 200 to 206 (203), subcaudals 135 to 140 (138), body length 721 to 1,150 mm, tail length 344 to 485 mm, ratio of tail to total length 30.9 to 32.3. One female has: Abdominals 205, subcaudals 141, body length 752 mm, tail length 348 mm, ratio of tail to total length 31.6 per cent.

Drymobius margaritiferus fistulosus Smith

Two specimens, an adult female and an immature male. In general, the adult fits Smith's description (1942, p. 383) of the types. The black scales with light centers show considerable variation, but all or nearly all show a complete black border. On the dorsum the light center is light blue, with a longitudinal yellow streak through its center. On the sides the blue center gradually increases its area on each scale at the expense of the black until the first scale row and the ends of the ventrals show the light blue areas in conspicuous contrast with the narrow black borders which are wider on the posterior edges. In the same direction the yellow streak diminishes in intensity until it is nearly obsolete on the first scale row and entirely missing on the ends of the ventrals. The black borders of the ventrals (abdominals and subcaudals) are limited to the extreme ends.

The young male is similar, except that the yellow streak is missing in the blue portions of the scales and the ventrals have longer and more conspicuous black borders.

Scalation: Scale rows 17-17-15. Supralabials 8-8 with 4 and 5 in orbit and 3 barely entering, and 9-9 with 5 and 6 in orbit and 4 barely entering. Infralabials 10-10 and 10-9. Preoculars 1-1; postoculars 2-2. Abdominals 148 and 151; subcaudals 29 + and 117.

Length: Body 645 and 199; tail 105 + and 104 mm; total 750 + and 303. In young male, tail represents 34.3 per cent of total length.

Dryadophis melanolomus tehuanae Smith

Six specimens collected in hilly country in second-growth timber. In alcohol, general appearance above, nearly unicolor (lighter on tail) slate tinged with blue or brown and slate blue in freshly shed specimens. Closer examination, however, reveals that many scales have dark edges anteriorly and slate blue centers, whereas other scales, especially on the anterior part of the body, have the dark pigment extending over most of the scale. All scales have white fringes on the posterior V-shaped edges which produce the appearance of diamond shaped white markings around each scale, which is a conspicuous feature of the general pattern.

Scalation: Dorsal scale rows 17-17-15. Supralabials 9-9 except one which is 8-9. Infralabials 10-10 in 3 specimens, 9-10 in two and 9-9 in one. Preoculars 1-1 in 4 specimens and 2-2 in two. Postoculars 2-2. Abdominals 177, 178, 181, 181, 183, 184. Caudals in the same sequence 55 +, 107, 113, 97 +, 103, 111. Body lengths 591 ♂, 675 ♂, 709 ♂, 740 ♀, 765 ♂, 780 ♀ mm; tail lengths 222 +, 165 +, 283, 306, 326, 314 mm; total length in same sequence 813 +, 840 +, 992, 1046, 1091, 1094 mm. Ratio of tail to total length, males 28.5 to 29.9 per cent; females 28.7 to 29.3 per cent.

Drymarchon corais melanurus (Duméril and Bibron)

Three specimens, two females and a male, which seem to be intergrades between *melanurus* and *rubidus* as described by Smith (1941, p. 476). Two of the snakes, Nos. 2583 ♂ and 2746 ♀, are nearer *melanurus* than *rubidus*. They are both distinctly lighter anteriorly than posteriorly. The preocular labials are partly edged with black, and the light areas of the labials are light brown, not white. Most of the posterolateral gular scales are tipped with black. Anteriorly, about one-third of the ventral plates are black on the posterolateral surface of one or both sides. Although not of regular pattern, these black streaks become progressively longer and more frequent until they cover the scales forming a solid black color posteriorly on body and tail for about one-third of its length. No. 2521 ♀ is nearer *rubidus*, being much darker dorsally than the others, but there is much less contrast between the anterior and posterior portions of the body. The dorsal surface of the head is nearly black. All the supralabials are edged posteriorly with black, and the light areas are light brown. Nearly all of the gular scales are tipped with black. The ventral pattern, although similar to the others, has much more black pigment.

Scalation: Supralabials 8-8; infralabials 9-9. Dorsal scale row formula 19-17-15 or 14. Abdominals: one male 188, 2 females, 195 and 191. Subcaudals: male 78, females 72 and 71. Measurements. Body length: male 1,320 mm, females 1,215 and 840 mm. Tail length: male 321, females 281 and 201 mm. Ratio of tail to total length: male 19.6 per cent, females 18.8 and 19.3 per cent.

Elaphe chlorosoma (Günther)

A young female showing distinctly the juvenile pattern has a series of 59 dorsal blotches with light brown centers and dark brown edges on the body and 25 less distinct blotches on the tail. These body blotches, reaching to the fourteenth scale rows, run transversely diagonal across the dorsal surface through the light brown ground color. Anteriorly on the body there is a series of lateral blotches which alternate with the dorsal blotches for about one-fourth the length of the body. Posteriorly they become indistinct. The ventral surface is immaculate.

Scalation: Scale rows 31-37-23. Abdominals 274; subcaudals 111. Anal divided. Supralabials 8-8; infralabials 9-10. Preoculars 1-1; postoculars 2-2. Length of body 585 mm; of tail 149 mm; total 734 mm. Tail represents 20.3 per cent of total length.

Leptophis diplotropis diplotropis (Günther)

Fourteen specimens, arboreal in habit, from banana groves and light forested areas. The basic color is blue, darker above than below. In alcohol, it varies dorsally from a light blue (34 F 6 near lotus) through varying stages of pigmentation to a very dark blue (40 A 6 near slate). Two phases of coloration seem to be exhibited, a dark and a light phase.

The light phase has a black line running through the orbit, extending forward faintly to nostril and involving the upper edge of labials. Posteriorly, it occupies the lower postocular, most of the first temporal, the lower post temporal, upper edges of last two labials and the lower edge of the upper posttemporal. The head above is light blue and below is mainly white, usually being suffused with blue on the upper labials and the lateral gulars.

Behind the head the black line widens until it involves scale rows 3 to 6 and edge of row 7. Back about 5 or 6 centimeters this line begins to break into obliquely transverse dark blotches, which gradually become less distinct and disappear about a third or half way along the body. Along the center of the back, the vertebral scales are much lighter in color, some nearly white, giving the appearance of a chain of light-colored diamonds. Behind the neck the paravertebral scales become keeled and the keels become colored black, thus forming a pair of narrow black paravertebral lines which extend backward to the anus. The white of the throat gradually becomes suffused with blue posteriorly.

The dark phase is similar but darker and has black covering the entire top of the head and neck, except the light vertebral diamonds.

Scalation: Scale rows 15-15-11. Supralabials 8-8, except one 8-9; infralabials, 10 with 11-11, 3 with 11-10, and 1 with 10-10. Preoculars 1-1; postoculars 2-2. Loreal single. Nasal divided.

LEPTOPHIS DIPLOTROPIS DIPLOTROPIS (GÜNTHER)

No.	Sex	Abdominals	Caudals	Length			Ratio (%)
				Body	Tail	Total	
2567	♂	169	117+	601	—	—	—
2569	♂	173	152	610	334	944	35.4
2579	♂	171	137	642	346	988	35.0
2713	♂	171	127	636	339	975	34.8
2714	♂	174	138	691	345	1036	33.3
2728	♂	172+1	137	682	355	1037	34.2
2729	♂	173	148	768	441	1209	36.5
2730	♂	174	111+	682	306+	988+	—
2753	♂	173	134+	710	379+	1089+	—
2791	♂	176	134	763	393	1156	34.0
2754	♀	177	99+	750	302+	1052+	—
2765	♀	175	116+	632	291+	923+	—
2766	♀	172	125	630	312	942	33.1
2772	♀	174	134	595	311	906	34.3

Trimorphodon biscutatus biscutatus (Duméril and Bibron)

Fourteen specimens, nocturnal in habits, from hillsides and lowlands, light forests, or open areas.

Coloration: Gray above, yellowish below with dark brownish-gray blotches forming series along the back, along the sides and along the ends of the ventrals. The dorsal series shows a great deal of variation, ranging from plain transverse light-centered blotches (secondary), toward one extreme becoming narrower and less distinct until only a light brown area is left (tertiary blotches), and toward the other extreme becoming wider and more conspicuous

until some partially split to make pairs of light centered blotches (primary) joined at the lateral ends; but occasionally separated.

According to our interpretation these variations of blotches represent developments of some at the expense of others. In order to explain the present pattern, we propose to assume a hypothetical primitive ancestral pattern derived from evidences still persisting on the specimens. This pattern consisted of light areas alternating with dark dorsal blotches which numbered about 65 to 72 on the body and a similar pattern extended on to the tail.

A change in this pattern was produced by expansion of alternate dark blotches, correlated with a suppression of the others both in size and color, leaving a pattern of about 32 to 36 dark blotches alternating with light tertiary blotches bordered by the primitive light interblotch areas, presumably like *quadruplex*.

Some specimens show an additional or secondary reduction, especially in the midbody region, in which some alternate dark blotches (usually not all) expand in correlation with suppression of those secondary dark blotches between them, leaving a pattern usually unchanged on neck and posterior body, but showing in midbody some expanded primary blotches alternating with narrower more or less suppressed secondary blotches which in turn are bordered by the plain remnants of the tertiary blotches which again are usually bordered by the light interblotch sections. In a few cases, these latter light areas are missing and the plain tertiary remnants are fused with the secondary blotches to make one on the dorsum but laterally the three are often clearly indicated.

The number of primary blotches left depends largely upon the number and amount of secondary reductions. It is nearly impossible to set a precise limit between primary, secondary and tertiary blotches because they show all degrees of gradation between them. Separated on the basis of judgment, the specimens show a range of 20 to 33 primary blotches.

Scalation: In all specimens, both nasal and anal are divided; both pre- and postoculars are 3-3, except one specimen which has 4 postoculars on one side. Some variable characters are listed in the table below.

A comparison of ventrals on our specimens with similar data taken from Smith (1941, p. 158; 1943, p. 492) for populations from nearby regions is given as follows: UU specimens: Abdominals 245 to 267 (259), subcaudals 83 to 96 (88), total ventrals 335 to 357 (346). *T. b. semirutus:* abdominals 260 to 275, subcaudals 85 to 102, total ventrals 358 to 376. *T. b. biscutatus:* abdominals 251 to 271, subcaudals 81 to 96, total ventrals 343 to 359. *T. b. quadruplex:* abdominals 251 to 263, subcaudals 82 to 93, total ventrals 334 to 347.

Imantodes splendidus oliveri Smith

Two females from open forested areas and hillsides. Color patterns fit description given by Smith (1942, p. 388).

Scalation: Dorsal scale rows 17-17-15. Anal divided. Supralabials 8-8. Infralabials 10-10.

TRIMORPHODON

No.	Sex	Scale rows	Abdominals	Caudals	Total ventrals	Labials		Loreals	Body blotches	Length			Ratio (%)
						Supra	Infra			Body	Tail	Total	
2523	♂	25–25–20	255	96	351	9–9	13–13	3–3	21	771	184	955	19.3
2722	♂	26–27–20	254	93	347	10–9	12–13	4–3	27	860	202	1062	19.0
2744	♂	25–25–20	245	90	335	9–9	12–12	3–3	20	452	96	548	17.5
2554	♀	25–26–19	262	85	347	9–9	13–12	2–2	22	941	184	1125	16.4
2710	♀	25–26–19	264	86	350	9–9	13–13	3–3	23	490	99	589	16.8
2711	♀	25–27–19	266	83	349	9–9	12–12	2–3	22	951	183	1134	16.1
2721	♀	25–25–20	247	91	338	9–9	12–12	2–3	22	767	189	956	19.8
2745	♀	25–27–20	261	83	344	9–9	12–13	2–3	22	467	88	555	15.9
2760	♀	27–28–20	267	64+21	352?	9–9	12–13	3–3	24	1074	177+	1251+	—
2762	♀	26–26–19	253	84	337	9–8	12–13	3–3	24	724	171	895	19.1
2770	♀	25–26–21	267	90	357	9–9	13–14	3–3	24	994	135+	1129+	—
2776	♀	23–26–19	262	86	348	9–9	12–12	3–3	23	559	105	664	15.8
2777	♀	25–27–20	264	88	352	9–9	14–14	3–3	22	881	189	1070	17.7
2783	♀	25–28–22	256+1	69+17	342?	9–9	13–13	3–3	33	930	160+	1090+	—

? indicates estimated value.

Preoculars 1-1, postoculars 2-2. Loreal single. Nasal single. Abdominals 237 and 225; caudals 132 and 123, respectively.

Length: Body 628, tail 252, total 880 mm; body 605, tail 239, total 844 mm. Tail 28.6 and 28.3 per cent respectively of total length. Vertebral scales only slightly larger than adjacent paravertebral scales.

Leptodeira maculata (Hallowell)

Three specimens found usually in brush. Dorsal ground color light brown. There are 26–29 dark brown blotches extending from the neck to the anus and 12 on the tail. Some of these blotches are confluent. The blotches extend laterally to the first, second, or third scale rows. Ventrals immaculate.

Scalation: Nasals divided. Loreal single. Both preoculars and postoculars 2-2. Supralabials 8-8; infralabials 10-10. Anal divided. Scale rows 21-21-17, 21-23-17, 21-25-17. Abdominals 167, 171, 175. Subcaudals 74, 33 +31 estimated (broken), 67.

Body lengths 380, 408, 494 mm, tail lengths 115, 56+, 121 mm. Ratio tail to total length: male 23.2 per cent, female 19.7 per cent. Body blotches: male 26, female 29. Tail blotches 12.

Manolepis putnami (Jan)

Three specimens collected toward evening on open roads around open brush under which they spend the night, according to the collector. The color fits the description given by Cope (1898, p. 1092).

Scalation: Dorsal scale rows 19-19-15. Anal divided. Upper labials 8-8. Lower labials 10-10. Preoculars 1-1. Postoculars 2-2. Loreal absent. Nasal divided. Abdominals: one male 169, 2 females 179 and 180. Subcaudals: male 73, females 64 and 65.

Body length: male 399 mm, females 315 and 500 mm. Tail length: male 121, females 77 and 130 mm. Ratio of tail to total length: male 23.3 per cent, females 19.6 and 20.6 per cent.

Conophis vittatus viduus Cope

Sixteen specimens taken from sparsely wooded or lightly forested areas, particularly around the edges of openings in the forests. Ground color creamy white with one dorsal and two lateral black or brown stripes, two or three scale rows wide, beginning at the rostral edge and running posteriorly to the tail where they become faint on the tip. The lateral stripes border the upper edge of labials and pass through the orbit under the supraoculars.

Scalation: Dorsal scale rows 19-19-17 in all but two specimens which show 19-19-15. Anal divided. Upper labials 7-7. Lower labials 8-8 in 4 specimens, 9-8 in one, 9-9 in eight, 9-10 in two and 10-10 in one. Preoculars 1-1 in twelve specimens, 1-2 in three and 2-2 in one. Postoculars 2-2. Loreal single. Nasal divided. Abdominals: 9 males 154 to 166 (159.6), 7 females 162 to 170 (167). Subcaudals: males 61 to 69 (65), females 57 to 67 (62.8).

Total length: males 454 to 724 mm, females 222 to 752 mm. Tail length: males 111 to 156 mm, females 45 to 142 mm. Ratio of tail to total length: males 20.8 to 24.9 per cent, females 17.4 to 20.8 per cent.

Oxybelis acuminatus (Wied)

Nine specimens taken in arboreal habitats in low second-growth timber. Ground color generally ashen to brownish gray and brownish red, both below and above. Head above same as body. Supralabials creamy white separated from dorsal head color by a black line which extends from edge of rostral along upper border of labials to neck region. Lower labials, chin and neck are creamy white, the color gradually fading into ground color on first few abdominals.

Scalation: Dorsal scale rows 17-17-13 in all but two specimens which show 17-17-15. Anal divided. Upper labials 9-9 in 6 specimens, and 9-10 in three. Lower labials 9-9 in 2 specimens, 10-10 in two, 10-11 in three, 10-12 in one, and 11-11 in one. Preoculars 1-1. Postoculars 1-1 in two specimens, and 2-2 in seven. Loreal absent. Nasal single. Abdominals: 5 males 186 to 194 (191), 4 females 188 to 199 (193.5). Subcaudals: 5 males 167 to 181 (175), 3 females 163 to 168 (165).

Total length: 5 males 1,276 to 1,468 mm, 3 females 1,313 to 1,395 mm. Tail length: 5 males 531 to 609 mm, 3 females 510 to 539 mm. Ratio of tail to total length: 5 males 40.4 to 42.1 per cent, 3 females 38.6 to 38.8 per cent.

Tantilla rubra Cope

Two specimens, female and juvenile, found under refuse and fallen timber, feeding prin-

cipally on small insect life, according to the collector. Color as described by Smith (1942, p. 40), except that in addition part of the lower labials are black.

Scalation: Scale rows 15-15-15. Abdominals 147 and 164; subcaudals 60 and 68. Labials all 7-7 except one with infralabials 6-6. Preoculars 1-1; postoculars 2-2. Loreal missing; nasal divided; anal divided.

Length: 260+85 mm and 116+31 mm; totals 345 and 147 mm; ratio of tail to total, 24.6 and 21.1 per cent.

Coniophanes imperialis copei
Hartweg and Oliver

Three specimens collected under refuse and fallen timber. Color as described by Hartweg and Oliver (1938, p. 4). In addition, the male is darker than the females and all three specimens show two short lines produced by rows of dark specks on the ends of the anterior ventrals.

Scalation: Dorsal scale rows 19-19-17. Upper labials 8-8. Lower labials 9-9. Preoculars 1-1. Postoculars 2-2. Loreal single. Nasal divided. The male has 128 abdominals, 78 subcaudals, body length 234 mm, tail length 110 mm, total 344 mm, tail 31.9 per cent of total length. Two females have 131 and 135 abdominals, tails broken, body lengths 172 and 220 mm.

Coniophanes piceivittis Cope

A single specimen, a female, was collected. Dorsal ground color dark brown, with two dorsolateral white stripes running from the rostral above the orbit along the edge of the supraocular, along the outer edge of the parietals and on to the neck 6 or 7 scales, where they are broken for 2 scales and thence extend posteriorly to the tip of the tail. The white stripes occupy scale row 8 and halves of 7 and 9. The ventrals and the first three scale rows are immaculate, except on chin, lower and upper labials where the white is conspicuously stippled with dark brown. The yellow parietals and frontal are also stippled with brown.

Scalation: Dorsal scale rows 23-25-19. Anal divided. Supralabials 8-8; infralabials 10-10. Preoculars 2–2; postoculars 2-2; loreal single; nasal divided. Abdominals 172. Part of the tail is missing. Body length 155 mm.

Micrurus ephippifer (Cope)

A single female was collected under rubbish. Tip of head back to posterior tip of frontal, tip of parietals on top and postoculars and half of third supralabial on sides is black; mental and first two infralabials are also black. Behind this black ring is a yellow ring (white in alcohol) which extends back nearly to the posterior edge of the parietals and laterally through the last infra and supralabials. Behind this is a black nuchal color which involves the posterior tip of the parietals and extends posteriorly eight scales in the dorsal surface and ends on the fourth abdominal ventrally. There are fifteen black rings (5 abdominals wide) on the body and three on the tail. These 15 complete black rings are bordered on both sides by yellow (white) rings about $2\frac{1}{2}$ scales wide which enclose 14 red rings that have the dorsal surfaces mostly replaced by black but some red edges persist. This dorsal black extends down the sides usually to the third, second or first scale rows producing some concave borders anteriorly and a few black spots occur on the ventral surface.

Scalation. Scale rows 15-15-15. Labials 7 and 7. Preoculars 1-1; postoculars 2-2. Loreal absent. Nasal divided. Abdominals 224; subcaudals 36. Body length 400 mm, tail 41 mm, total 441 mm. Tail 9.3 per cent of total length.

Stenorhina freminvillii lactea Cope

Two females collected in underbrush. Color in alcohol light red above on head, body, and tail. This color becomes gradually lighter on sides and fades into pink on the ventral surface, being darker under the tail and progressively lighter anteriorly toward the chin. The upper and lower labials are a very light pink. One specimen has a narrow black streak beginning on the upper edge of second supralabial which extends backward along the upper edge of the labials, through the eye, involving the preocular, lower postocular and ending on the seventh labial. On the other specimen, this line is nearly missing. Both specimens show suffusion of dark pigment on the parietals and indications of a faint middorsal line extending backwards.

Scalation: Dorsal scale rows 17-17-17. Anal divided. Labials all 7-7 except one has 7-8 infralabials. Preoculars 1-1; postoculars 2-2. Loreal 1-1 in one specimen, and 1-0 in the other. Nasal divided; temporals 1-2-3. Abdominals 167, 179;

caudals 39, 35. Body length 472, 510 mm; tail length 83, 73 mm; total length 555, 583 mm. Tail 15 and 12.5 per cent of total length.

Bothrops dunni (Hartweg and O'iver)

Eleven specimens, four adults, and seven juveniles from wooded and brushy areas around open fields, in nearly the same type habitat as the rattlesnake. Color as described by Hartweg and Oliver (1938, p. 6). The dorsal blotches vary from 13 to 20 in number. Adult males are darker than the females and some of the juveniles can be similarly separated, but others are indistinguishable.

Scalation: Dorsal scale rows 23-23-19 in six specimens and 25-23-19 in three specimens. Anal entire. Supralabials 9-10 in two specimens, 10-10 in five, 10-11 in one, and 11-11 in one. Infralabials 9-11 in one specimen, 10-10 in four, 10-11 in three, and 11-11 in one. Preoculars 3-3. Postoculars 3-3 in seven; 3-4 in one, and 2-2 in one specimen. Nasal divided. Abdominals: 7 males 145 to 151 (147), 4 females 150 to 156 (152.5). Subcaudals: males 37 to 41 (40), females 32 to 38 (35). Body length: Males 159 to 348 mm, females 192 to 415 mm. Tail length: males 23 to 56 mm, females 22 to 53 mm. Ratio of tail to total length: males 12.1 to 13.9 per cent, females 10.3 to 11.6 per cent.

Crotalus atrox Baird and Girard

A single female was collected. Dorsal scale rows 25-25-21. Anal entire. Supralabials 16-15; infralabials 16-16. Preoculars 3-3; postoculars 2-3. Loreal single. Abdominals 179; subcaudals 24. Length: body 294 mm, tail 20 mm, total 314 mm. Tail 6.4 per cent of total length. Body blotches 39; tail blotches 6. The snake contained a *Cnemidophorus* lizard.

Crotalus durissus durissus Linnaeus

A single female was collected. Dorsal scale rows 29-31-21. Anal entire. Supralabials 16-15; infralabials 15–17. Preoculars 1-1; postoculars 2–3. Loreals 2–2. Abdominals 184. Subcaudals 26. Dorsal body blotches 27. Length: body 408 mm, tail 32 mm, total 440 mm. Tail 7.3 per cent of total length.

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ZOOLOGY.—*A new brittle-star* (Ophiocoma anaglyptica) *from Canton Island.*[1]

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H. L. Clark lists 19 species for the genus *Ophiocoma* Agassiz in his "The Echinoderm Fauna of Torres Strait."[2] All these have been known for 25 years or, in many cases, much longer. Since the publication of Dr. Clark's paper, apparently only three new species have been assigned to the genus, and one has been removed to the new genus *Ophiocomella* established by A. H. Clark in 1938. In view of the fact that the genus is a conspicuous one and already well known, the addition of another species is rather remarkable, although perhaps not surprising since the fauna of many isolated Pacific islands is still incompletely known.

Ophiocoma anaglyptica, n. sp.

Named *anaglyptica* (embossed) in reference to raised interbrachial plates.

Description.—The disk is about 20 mm in diameter, with well-spaced granules that encroach upon the interbrachial areas to a variable extent. Among the normal scales thus exposed in each interbrachial area are a number of enlarged bare plates, usually between 25 and 30. The genital slits are bordered by eight to ten small granules. In length the arms are about five times the width of the disk. The upper arm plates, which are thickened and raised above the general surface, are about two and one-half times as broad as long; of irregular outline and extremely variable in shape. The majority of these plates suggest an open low-arched fan from which one of the lateral angles has been sheared abruptly. The uppermost arm spine on the side of the missing angle is greatly swollen and enlarged, while a similar spine on the opposite side of the same segment is lacking. As a rule there is an alternation of this arrangement from segment to segment. Thus an upper plate with the right angle missing and a

[1] Received July 15, 1944.
[2] Carnegie Inst. Washington Publ. 214 (Dept. Mar. Biol., vol. 10). 1921.